

(12) UK Patent Application (19) GB (11) 2 188 399 (13) A

(43) Application published 30 Sep 1987

(21) Application No 8706818

(22) Date of filing 23 Mar 1987

(30) Priority data

(31) 293147
8700385

(32) 24 Mar 1986
5 Feb 1987

(33) ES

(51) INT CL⁴

F16K 31/528

(52) Domestic classification (Edition I):

F2V S10

U1S 1073 1105 F2V

(56) Documents cited

GB A 2155155

GB 1227337

GB 1176539

GB 1415710

(58) Field of search

F2V

Selected US specifications from IPC sub-class F16K

(71) Applicant

Officina De Investigacion Agrupada S.A.

(Incorporated in Spain)

Maxtaria 1, 20600 Eibar, Guipuzcoa, Spain

(72) Inventor

Domingo Fidel Azpitarte Bolivar

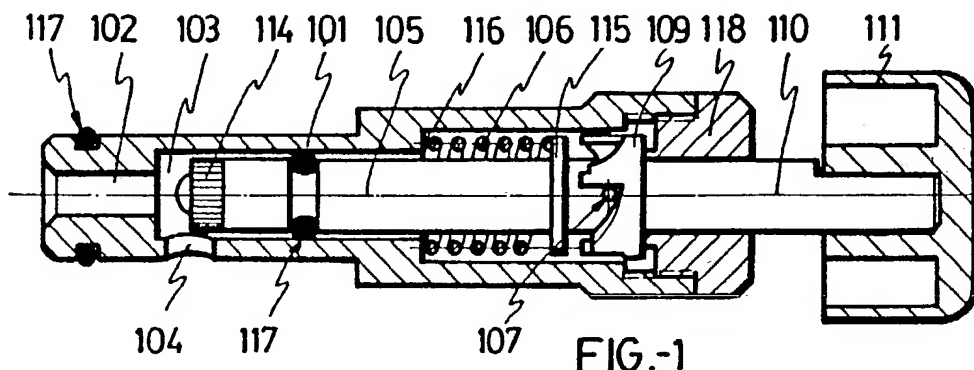
(74) Agent and/or Address for Service

Carpmaels & Ransford,

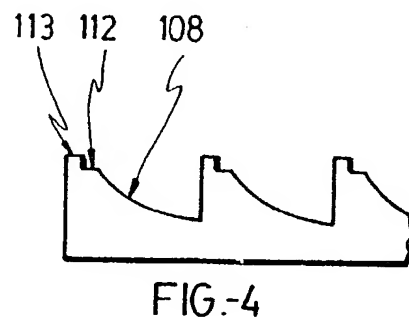
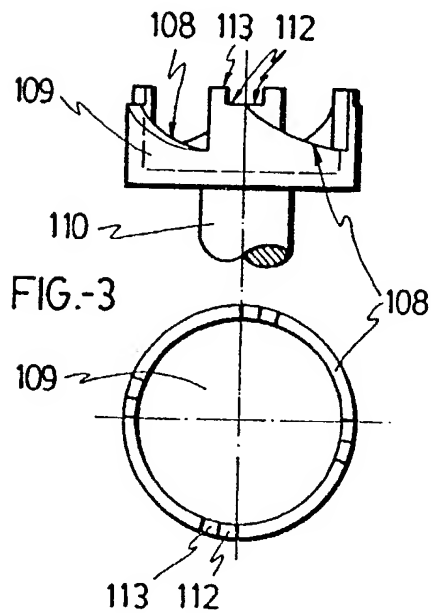
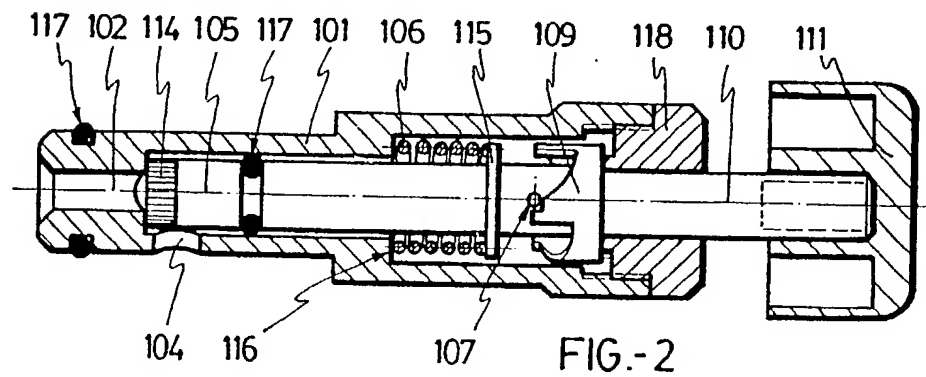
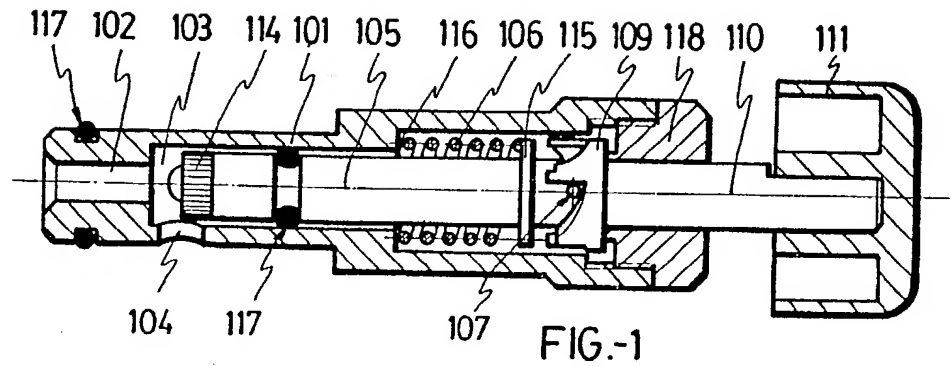
43 Bloomsbury Square, London WC1A 2RA

(54) Valve for coffee makers

(57) In a water valve for coffee makers in which a valve body 101 is provided at one end with an axial hole 102 which communicates, through the cavity 103 of the valve body 101, with a radial opening 104 made in the wall of the valve body 101, the axial hole 102 may be closed by the plug end 114 of an axially displaceable shaft 105. The shaft 105 is provided at its rear end with radial bearings 107 which slide over cam profiles made as slopes 108 in a member 109 integral with a shaft 110 carrying a control knob 111 at its free and externally projecting end. Rotation of the control knob 111 in the closing operation causes displacement of the bearings 107 over the inclined plane 108, the displaceable shaft 105 thus moving axially against driving means 106 and resulting in closure of the axial hole 102. Opening is aided by the action of the driving means 106 which assist the movement of the bearings 107 along the inclined plane 108, thus opening the axial hole 102.



GB 2 188 399 A



2/2

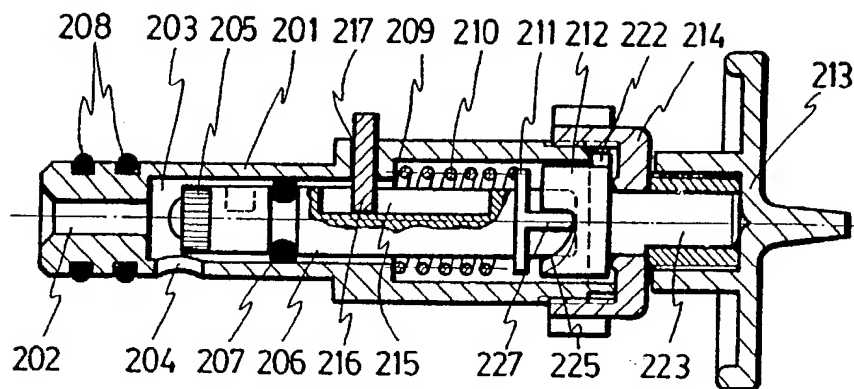


FIG.-5

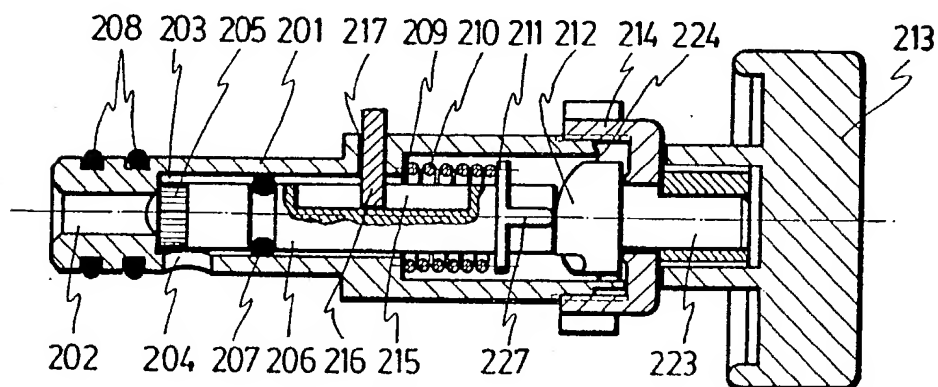


FIG.-6

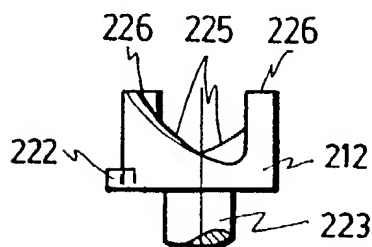


FIG.-7

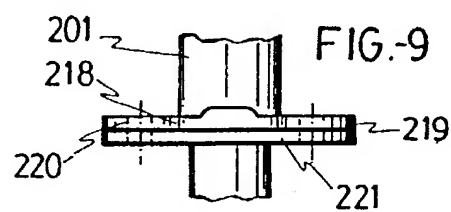
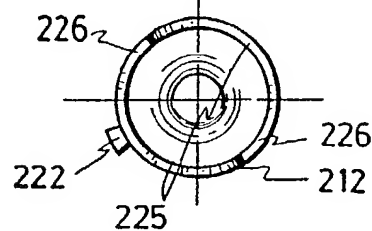


FIG.-9

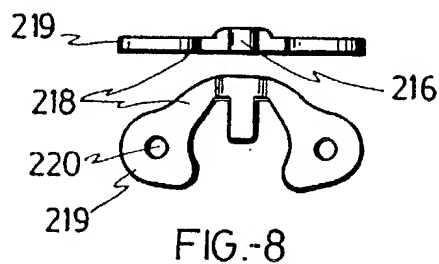


FIG.-8

SPECIFICATION

Water relief valve for coffee makers

5 OBJECT OF THE INVENTION

The present invention relates to a water relief valve, designed specially for coffee makers, the object whereof is obviously to either allow or discontinue the passage of water to the coffee maker from a corresponding feeding reservoir.

BACKGROUND OF THE INVENTION

There are known valves for controlling the passage of water, basically constituted by an elongated valve body, generally rounded in shape, within which a closing element related to a control knob may be axially displaced, which valve body is designed to be housed within the passage to be closed, and is provided with axial and radial apertures which may or may not be in communication, depending on the position adopted by a plug element established at the confluence of the two apertures and controlled by the manually-operated external knob.

Although the aim of such valves is to establish two different positions of 'passage' and 'closure' for the water, and not to regulate the flow rate thereof, the axial displacement of the plug element in said valves is achieved by means of mutual threaded engagement of the two threaded sections of the inner wall of the valve body and of the inner wall of the plug element, the wear due to such threading being obviously one of the more frequent sources of breakdown and damage in such conventional valves.

A further disadvantage and cause of operative breakdowns and defects derives from the plug seat of the closure element on the mouth of the passage to be closed, and, more specifically, from the fact that the surfaces taking part in such closure are metallic, thus causing wear and breakdowns.

The mentioned sources of breakdown usually result in the need for substituting the valve body and/or the closure element as a whole, for the two are made in one piece.

Furthermore, in the case of the closure element, the lack of resiliency between the surfaces making up the closure means that once the wear or disadjustment appears, it remains until the faulty element is changed.

DESCRIPTION OF THE INVENTION

The water relief valve for coffee makers of the present invention provides a wholly satisfactory solution to the above problem, allowing the displacement of the closure element with no need for mutual threaded engagement between said closure element and the valve body, the closure element being further comprised by two separate parts, a front section or closure element, which verifies the closure

seat, and a rear section, this being the only one related to the external control knob of the valve body.

Only two necessary positions are contemplated for operation of the valve of the invention, i.e., a closed position in which passage of water is prevented, and an open position in which the water is allowed to flow freely.

These two positions are determined by a cam profile related to the section corresponding to the closure element which is in turn related to the control knob, and by a bearing integral with the front section of the closure element and which, by sliding along the cam profile, causes displacement of said front section, which displacement, on closure, takes place against the force of a resilient spring. When the valve starts to open, the said spring extends and thereby displaces the front section backwards. In accordance with a preferred practical embodiment, there are provided four identical cam profiles along the 360° corresponding to one complete turn of the control knob, and two diametrically opposed bearings are provided in the front section of the closure element.

However, this extremely simple solution carries a risk that, if an excess pressure is applied to the control knob, it may drag the front section therewith on rotation after said front section has been displaced into the closed position, for said section is related to the valve body only by means of a toric airtight joint and by the spring itself. This problem, although it does not directly affect the valve from an operative point of view, i.e., achieving the closed and open positions, may cause an uncontrolled lack of synchronisation for extreme open and closed positions, thus resulting in disadjustment between the control knob and the corresponding indicator dial, in cases where the latter is present.

The above problem is solved in a different embodiment of the valve, which, whilst maintaining the basic structural characteristics of the previous case, as regards the existence of a valve body having an axial duct and a radial aperture at its inner end, and as regards the existence within said body of a front section comprised by a shaft ending in a plug head, likewise permanently held by a spring and operated by an external knob, centres its basic characteristics in the provision of blocking means for said shaft or front section, with respect to its angular movement, the said means specifically consisting of a cotter pin established within the valve body, and which engages a cotter pin hole operatively made in the shaft, in such a way that said shaft may be freely and axially displaced with respect to the cotter pin, whereas said cotter pin prevents rotation thereof.

In this varying embodiment it has been further provided that the maximum rotation of the knob is not established at the end of the

inclined planes or cams acting on the bearings, i.e., not on the edge of the receptacle wherein the mentioned cams are defined, but rather on the wall or external side surface of said receptacle and near the base thereof, there being furthermore a single abutment projecting radially from said receptacle which plays in a groove provided in the mouth of the valve body, whereby angular movement of the knob is determined by the valve body itself, which remains fixed at all times, and not by the axially displaceable shaft, as in the first embodiment.

Thus, a double purpose is achieved, one being that the angular movement supplied to the control knob is well defined by an abutment which relates the said knob to the casing or valve body of the device, and the other that rotation of the closing shaft is prevented, thereby likewise eliminating all such problems as might for any reason arise in transmitting movement of the receptacle related to the knob to said shaft, such as, for example, due to play or the like, which would tend to rotate the shaft rather than to cause axial displacement thereof along the planes or cams of the receptacle on rotation thereof.

DESCRIPTION OF THE DRAWINGS

In order to complete the description being made, and to assist the better understanding of the characteristics of the invention, a set of drawings is attached to the present specification, as an integral part thereof, wherein the following has been shown, in an illustrative and non limiting manner:

Figure 1 is a side elevational view and diametric section of a water relief valve for coffee makers in accordance with the present invention, shown in its open position.

Figure 2 shows a similar view to that of *Fig. 1* with the said valve in its closed position.

Figure 3 shows a side elevational view and a plan view of the receptacle wherein are established the cam profiles for actuating the front section or plug element.

Figure 4 is a diagrammatic 'unfolded' view of the side surface of the receptacle of the preceding figure, clearly showing the cam profile thereof.

Figure 5 is a side elevational view of a water relief valve for coffee makers in accordance with a varying embodiment of the present invention, shown in its open position.

Figure 6 shows the same valve as in the preceding figure, in its closed position.

Figure 7 shows an enlarged detail in a side elevational and plan view of the receptacle associated to the control knob which acts as a cam for axial displacement of the plug element, in the varying embodiment of *Figs. 5* and *6*.

Figure 8 shows another enlarged detail in side elevational and plan views as in the preceding figure, of the cotter pin established in

the valve body for preventing angular movement of the shaft.

Figure 9 finally shows a partial plan view of the valve body, showing the cotter pin coupling means.

PREFERRED EMBODIMENT OF THE INVENTION

In the light of *Figs. 1* to *4*, showing a first embodiment of the water relief valve for coffee makers of the present invention, it can be seen that said valve is comprised by a valve body 101, established within the passage to be closed, and which is provided with an axial aperture 102, connected to a chamber 103, which is in turn provided with a radial aperture 104 leading to the water reservoir.

The internal mouth of the axial hole may be closed by the front end of an axially displaceable shaft 105 provided with a pair of diametrically opposed radial bearings 107 at its other end, which bearings rest on a cam profile made on the edge of a receptacle-like part 109 which is in turn related to a shaft 110 projecting from the threaded lid 118 and carrying the control knob 111 at its free end.

In the preferred embodiment, the edge of receptacle 109 is provided with four identical cams (figure 3 and 4), each of which covers 90° and is comprised by an inclined section 108, starting at the bottom of receptacle 109, followed by a small annular flat plane 112 large enough to house the radial bearing 107, such that its position is stable; after the flat section 112 there is provided a small flange 113 which determines maximum rotation in the valve closing operation.

The cavity within the valve body 101, corresponding to the rear half of the displaceable shaft 105, widens by means of stepping 116 and defines, together with the annular rim 115 of the shaft 105, a space which is variable in length and contains a spring 106, such that forward movement of the shaft 105 on closing takes place by compressing the said spring 106, which spring also ensures that the shaft 105 returns to its initial position on opening. The rim 115 is obviously placed such that in the most retracted state of the displaceable shaft 105, it does not abut the flange 113 of receptacle 109.

Operation of the valve from the open position shown in *Fig. 1*: on turning the knob 111 towards the right, the inclined plane 108 causes the forward axial displacement of bearing 107 against the tension of spring 106, which will be gradually compressed; after a 90° rotation, the end of displaceable shaft 105 abuts the axial hole 102, thus preventing the passage of water, and bearing 107 abuts rim 113; for opening, a slight rotation of the knob towards the left causes bearing 107 to leave the flat section, and the action of the spring 106 assists the said bearing in its descent to the end of the inclined plane, thereby reaching the stable position in which the valve

is fully open.

The embodiment described is provided with a rubber shoe 114 or the like at the front edge of the displaceable shaft 105, such that closure takes place with a resiliency which tends to absorb wear caused by use, defect or excess tightening, thus ensuring perfect closure during the useful life of said shoe 114.

The embodiment described is further provided with respective toric joints 117 to ensure airtightness of the valve body 101 with respect to the coffee maker and to the inner cavity of the valve body 101 corresponding to the rear half of the displaceable shaft 105.

Optionally, and in accordance with the varying embodiment shown in Figs. 5 to 9, the valve comprises the same valve body 201, with an axial duct 202 at its inner end for coupling within the water duct, as an extension of the inner hollow cavity 203, a radial aperture 204 being likewise provided near duct 202 for passage of water thereto when the closure element 205 at the end of shaft 206 thus allows, said hollow inner cavity or chamber 203 being sealed with respect to the driving mechanisms at the area through which water passes, by means of a toric joint 207, whilst a further pair of toric joints 208 seal the valve body 201 at its coupling to the water duct. As in the embodiment of Figs. 1 to 4, a stepping 209 is established in valve body 203 for housing a spring 210 which tends to eject shaft 206, the other end of which spring abuts an annular flange 211 and is acted against by receptacle 212 related to the control knob 213 which is established outside the valve body and crossing the cover 214 thereof, the said cover being threadedly engaged to the body.

Based on such common elements, the shaft 206 in the said second embodiment includes a cotter hole 215 of suitable length for allowing free axial displacement of said shaft on actuating the knob 213, the said cotter hole being provided in correspondence with one of the generatrices of shaft 206 and in which plays a cotter pin 216 which crosses the valve body 201 through a bore 217, and which projects in a single piece as a laminar body 218, approximately U-shaped, the inner edge of its side branch corresponding to the valve body 201, its outer edges extending into lugs 219 provided with holes 220 through which the body of the cotter pin is coupled by screwing or any other conventional means, to the flat transversal extension 221 provided therefor in valve body 201, as shown specifically and in detail in Fig. 9.

In accordance with a further characteristic of the invention, maximum rotation of knob 213, and thus of receptacle 212, is determined by a single rib 222 emerging radially from the side surface of said receptacle, near the coupling thereof to shaft 223 relating same to the

control knob 213, which rib plays within a groove 224 operatively made in the mouth of valve body 201, the size thereof being in accordance with the maximum angular movement of the knob 213.

The receptacle includes a pair of diametrically opposed inclined planes or cams 225, ending in respective flat sections 226 through which it acts on displaceable shaft 206, specifically against respective and likewise diametrically opposed radial fins 227 thereof, in the direction of its generatrices, integral with the annular flange 211 on which rests spring 210, which flange together with the spring stiffens said fins against the forces of the double cam, thereby obtaining a more solid, resistant and efficient structure.

Thus, and in accordance with the structure described, from the open position shown in Fig. 5, rotation of the knob 213 is transmitted to receptacle 212 through shaft 223, whereby the inclined planes 225 on which rest the front edges of fins 227, cause axial displacement of shaft 206, through the fins and against the action of spring 210, towards the closed position shown in Fig. 6, rotation of the knob 213 being checked when the rib 222 provided in receptacle 212 abuts the corresponding end of groove 224 provided in the mouth of valve body 201, rotation of shaft 206 being likewise prevented through the angular component of the forces derived from the slope of inclined planes 225, due to the effects of cotter pin 216.

It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS

1. Water relief valve for coffee makers, characterised in that the front part of the valve body established in the water duct is provided at its end with an axial hole which communicates, through the cavity of the valve body, with a radial opening made in the wall of said valve body, which axial hole may be closed by the plug end of an axially displaceable shaft being provided at its rear end with radial bearings which slide over cam profiles made as slopes in the wall of a receptacle-like piece integral with a shaft carrying a control knob at its free and externally projecting end, such that rotation thereof in the closing operation causes upward displacement of the bearings over the inclined plane, the displaceable shaft thus moving axially against the driving means and resulting in closure of the axial hole, whereas opening is aided by the action of the said driving means, which assist the descent of the bearings along the inclined plane, thus opening the axial hole.

2. Water relief valve for coffee makers, in accordance with the preceding claim, charac-

terised in that the cam profile includes a flat section at the top of the inclined plane, at the end of which there is provided a flange, the said flat section defining the stable position at the end of the closing operation, the flange constituting the maximum displacement in said closing operation.

3. Water relief valve for coffee makers, in accordance with the preceding claims, characterised in that the cam profiles are preferably four in number and are uniformly distributed along the rounded surface of the receptacle, there being preferably two diametrically opposed radial bearings, such that displacement during the closing and opening operations will be of a quarter of a turn.

4. Water relief valve for coffee makers, in accordance with the preceding claims, characterised in that the end of the displaceable shaft preferably carries a rubber shoe for verifying the plug seat on closure of the axial hole.

5. Water relief valve for coffee makers, in accordance with the preceding claims, characterised in that the driving means for the displaceable shaft consist of a resilient spring acting by compression between an annular rim provided on the displaceable shaft and an inner stepping provided in the valve body, said annular rim being established such that it does not abut the edge of the receptacle wall even in the position of maximum aperture of the valve.

6. Water relief valve for coffee makers, in accordance with the preceding claims, characterised in that respective toric joints are provided for ensuring airtight sealing of the coffee maker in relation to the outside thereof, and of the inside of the rear part of the valve body in relation to the closing end in contact with the liquid.

7. Water relief valve for coffee makers, in accordance with claim 1, characterised in that the displaceable shaft carrying the plug element includes a cotter pin hole, in correspondence with one of its generatrices, wherein plays a cotter pin coupled to the valve body, such that said cotter pin allows free axial displacement of the shaft but prevents the angular movement thereof.

8. Water relief valve for coffee makers, in accordance with claim 7, characterised in that the mentioned cotter pin extends as a single, U-shaped body which may be coupled to the outer surface of the valve body, specifically to the side surface thereof, the external edge of the arms extending into a pair of lugs provided with apertures through which the said cotter pin is coupled to the valve body, specifically on laminar transversal projections provided thereon and having bores which operatively face the previously mentioned apertures on assembly of the cotter pin.

9. Water relief valve for coffee makers, in accordance with claim 7, characterised in that

the receptacle related to the control knob and having inclined planes or cams for axial displacement of the shaft includes a single rib which emerges radially from its side surfaces, near the base thereof, and which plays in a groove made therefor at the mouth of the valve body, the ends thereof defining two positions of maximum angular displacement of the receptacle, and therefore of the control knob related thereto.

10. Water relief valve for coffee makers, in accordance with claims 7 and 9, characterised in that said receptacle includes two diametrically opposed inclined planes or cams, whereas the end of the closing shaft includes two likewise diametrically opposed fins, arranged along its generatrices, the said fins being in turn related to the annular rim whereon rests the corresponding end of the recovery spring for the displaceable shaft.

11. WATER RELIEF VALVE FOR COFFEE MAKERS. substantially as hereinbefore described with reference to and as shown in Figs. 1-4 or Figs. 5-9 of the accompanying drawings.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd, Dd 8991685, 1987.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.

